Direct Observation and Photography of Electroconductive Points on Human Skin

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Abstract: Galvanic skin response when standardized, can clearly demonstrate the presence of an organized system of highly electroconductive points on human skin. A new technique described here allows visual observation and photography of these points which have been shown to be related to human autonomic nerve reflexes and clinical medical diagnosis.

IT IS well known to neurophysiologists that by measuring galvanic skin response (GSR), the electrical skin resistance can be shown to vary inversely with the amount of neurodischarge from the autonomic nervous system.[1] It has also been shown recently that decreased electrical resistance seems to concentrate at certain points on the skin rather than on its entire surface.[2, 3] This effect is due, at least in one way, to the variation in autonomic sweat gland activity at the skin surface and has also been found to vary with the anatomical concentration of nerve fibers beneath the skin, as observed at muscle motor points.[2] These points on the skin, therefore, can be said to represent areas of potentially high neuronal activity which, in turn, decrease the overlying skin resistance to some degree. Any physical disorder therefore, which intensifies autonomic activity, will noticeably decrease the electrical resistance at various areas over the skin related to the affected autonomic nerve.[3]

Skin resistances have been tested in the laboratory by measuring galvanic impedance, passing a small current between a stationary body electrode and an exploring electrode.[1] Although intriguing and qualitatively accurate, this technique has been considered to be fraught with too many variables to be of any scientific importance. In 1950, however, a standardized technique was developed in Japan by Y. Nakatani, which proved to be of some medical value.[4] Nakatani proposed a system of electrodiagnosis and electro-treatment based on research which he had done on the relationship of skin resistance to internal diseases. His method in Japanese is called *Ryodoraku* and is based on the fact that internal disease manifests itself in many ways, one being a dysfunction in the body's autonomic homeostasis.[5] In other words, a diseased organ or system will cause a concomitant disturbance in its autonomic input and output. This disturbance may be manifested systemically by increased pre- and post-ganglionic autonomic responses causing symptoms clinically associated with varying degrees of stress.[6] (For example, we would expect disturbances in cardiac rate and rhythm resulting from pathology of any somatic or visceral organ in the same reflex dermatome as the cardiac sympathetic plexus).[5, 7] Nakatani pro-

posed that these internal disturbances could be detected (even possibly before they were clinically manifest) by measuring the decrease in the electrical resistance of reflexly associated points on the skin. These observed points would thereby be indications of autonomic disturbance[1] associated with either the impending or clinically apparent disease.[4] He used a galvanometer which he called a neurometer, to measure skin resistance. The meter is standardized to 200 microamperes by closing the circuit, and measurements are made while the meter is preset at either 12 or 21 volts. While the patient holds a hand grip electrode, the operator passes an exploring electrode over the surface of the skin, noting the points which are measured to have an increased electroconductance. Using hundreds of subjects as controls to obtain baseline data, he noted that practically all individuals, healthy or diseased, displayed numerous minutely distinct low resistance points in common when measured at 21 volts. When measurements were made at 12 volts, however, the majority of the electroconductive points disappeared on the healthy subjects, but many remained on the diseased patients.[4] He also noted that the anatomical location of the electroconductive points in the unhealthy subjects varied with the disease and that subjects with the same disease had most of their detectable points in the same location.[4] In other words, even though a multitude of electroconductive points could be detected by using a higher voltage, the points affected by a disease were detectable more easily (i.e., using a lower voltage), indicating they are more electroconductive than their counterparts. These "disease points" also seem to be somewhat disease specific. This observation is supported by the presence of known autonomic visceral reflexes.[5] Another interesting phenomenon which he noted was that all of these electroconductive points which he found, were remarkably close in location and about equal in number, to points found on oriental acupuncture charts of the human body. It may be inferred by this finding that at least some acupuncture points and possibly all may represent these same points of potentially high autonomic activity on the skin.

It was only after learning this technique that this author became aware of the validity of not only the presence of, but also the significance of electroconductive points on the body. Their clinical importance also becomes obvious when Ryodoraku therapy is successfully applied, noting the normalization of these highly conductive points after the application of therapeutic electrostimulation.[4] By studying the viscero-cutaneous reflexes of Head and McKenzie,[5, 6] the relationship of these points to the autonomic reflex areas and their importance in the diagnosis and management of diseases also becomes apparent.[5] Of related clinical significance were recent American medical reports of rapid bone healing using electrical stimulation around the fracture site[8] and the prevention of postsurgical complications by electrical stimulation of skin adjacent to the incision site. Although the therapeutic mechanism has not been fully elucidated, a parallel was noted to Nakatani's work on Ryodoraku electrotherapy and diagnosis.

The stimulus for attempting to photograph these points arose from a study of the Kirlian phenomenon. A technique was described in Russia in 1961 by S. D. and V. K. Kirlian for the visualization and photography of electrostatic discharges emanating from various objects placed in a high frequency electric field.[10] When living things such as human fingertips were placed onto an energized photographic plate, corona-like spark discharges were seen to radiate from their periphery, exposing the plate and revealing a photograph of the phenomenon. It was noted that inanimate objects revealed an unchanging pattern from electrostatic discharges whereas living things had discharge patterns which varied according to stimuli, environmental factors and above all, states of disease. An interesting observation made was that living things after death assume the static unchanging pattern of inanimate objects.[11]

From the time that the Kirlian work was published, much research had been performed in pursuit of the etiology of this phenomenon.[12] Psychics claim that the photographed flame discharges and halos surrounding the human

fingertips represent the aura which allegedly surrounds living things. Skeptics believe they represent artifact, or perhaps moisture. There is evidence, however, that the technique may have some medical significance.[12] Though the technique and its results are fascinating in themselves, the author became interested in Kirlian photography because of its possible relationship to electroconductive body points and clinical medicine. Was the Kirlian effect the result of discharges emanating from these galvanically detectable electroconductive skin points, energized by a high frequency high voltage field? If so, would visual and photographic analysis of these points, if possible, assist in the diagnosis and detection of subclinical disease? These were the questions which stimulated this study.

Physically, the Kirlian effect is explicable by studying electrostatics. In the electric field produced by a high frequency high voltage generator, objects would become negatively charged on their surfaces.[11, 13] The electric charges will seek the path of least resistance, that is, the current tends to flow along the path that is relatively more positive or electroconductive than the adjacent areas.[13] The points from which discharges appear to emanate on the skin therefore, would in like manner be points which are more electroconductive than the adjacent ones. Theoretically then, the Kirlian photographs and galvanic variations of the neurometer could possibly reveal the same qualitative information and differ only quantitatively. If this logicism were valid, the author conjectured that it would be possible to photograph and make optically visible the electroconductive points of the skin which have been detectable galvanically and already proven to be of medical importance. In order to accomplish this end, research into a variation of the Kirlian technique was pursued.

Method of Experiment

The power source chosen for this technique was a Tesla coil[9] operating at 25,000 volts and 100 khz at very low microamperage. The primary problem seemed to be the development of a suitable electrode. In order to photograph or visualize such phenomena if it existed, it would be necessary to devise a type of transparent electrode which would be capable of exhibiting electrostatic spark discharges in a dynamic state. A single plate electrode similar to the types used in visualizing the Kirlian effect would not achieve this end. In order to propagate a spark, it is known that a space gap must exist between an object and a charged plate. The electrode developed must also be capable of being evenly charged and unaffected by the passage of high voltage spark discharges. After much trial and error, an acceptable electrode made of glass was produced. Since a space gap was necessary, a double plated glass electrode was devised. The plate considered to be electrically active consists of heat resistant glass coated on one side with a metallic oxide. The metallic coated side of the plate is wired to the Tesla coil and spaced approximately 0.15 cm from the second, electrically inactive glass plate, to which it was spot-bonded on its perimeter. This total entity comprises the Point Electric Discharge (PED) Plate™ electrode. Air is allowed to pass freely through the PED plate™ in order to allow ionization and subsequent spark propagation. This electrode is transparent and allows about 75% light transmission. The inactive plate is placed against the skin, a constant distance of 0.15 cm from the metallic coated active plate. With its edges well insulated, the PED plate™ could be placed anywhere on the surface of the body. The spark discharges theoretically would then emanate from the electroconductive points on the skin, gapping the air space and striking the metallic plate.

In order to photograph such phenomena, the PED plate™ was set in a fixed vertical position on a table and a 35 mm reflex camera was placed in front of it on a tripod. The film used was Kodak Ektachrome color slide film with an ASA number of 160. The shutter speed was set at 1/15 sec. and the f. stop at 2.0. The lens was focused just short of the inactive glass plate, approximating the distance to the air gap. This was done to give a clear image of the spark discharge within the electrode air space.

To make the photography simple, the fingers and hands were used because they could be easily placed behind the fixed PED plate.™

The lateral surface of the index finger was chosen as one test subject for two reasons: first, it can be easily rotated and pressed against the inactive glass plate of the electrode and secondly, there exists a line of electroconductive points along the lateral aspect of that finger which can be detected galvanically. (These points correspond closely to the "large intestine" meridian in oriental acupuncture). The medial aspect of the 5th finger was also used. The apparatus was set in a moderately darkened room with a slightly illuminated background for contrast in the photography.

Visual and Photographic Results

The predicted visual results were obtained. When the PED plate™ was placed against the skin over various areas of the body, and the Tesla coil activated by switching to maximum voltage, discreet spark discharges were seen to emanate from specific points on the skin. A remarkable phenomenon observed was the linear patterns of these discharge areas. Such patterns were comprised of very bright discharges surrounded by more randomly distributed discharges which were less intense. These visualized points created unchanging patterns on the surface of the skin.

The photography of this phenomenon was attempted by placing the index finger against the fixed electrode described, with the fingertip resting on the table top. The Tesla coil was again activated by a switch to maximum voltage, and discreet spark discharges were seen to emanate from the lateral aspect of the index finger with the unaided eye. This was then photographed. The discharges were bluish-white and flame-like in appearance (Fig. 1). This same phenomenon occurred when the medial aspect of the 5th finger was placed against the inactive plate of the electrode (Fig. 2). The most obvious fact that one notes in studying both photographs of the above phenomenon, is the distinctly linear pattern that the larger and brighter discharge areas present. This corresponds to the pattern of points detectable galvanically and closely resembles the pattern seen on acupuncture charts. While the power was on and the spark discharges were visible and distinct, the 5th finger was rotated on the plate in an attempt to see if the linear pattern rotated with it. If so, it would indicate that the discharges creating the pattern are dependent upon the conductivity of the finger and not due to an artifact in the electrode. When the finger was rotated, the linear pattern followed the skin of the finger as it rotated off the plate, leaving only a random distribution of point discharges emanating from the skin of the finger which had rotated on the plate (Fig. 3). This phenomenon lends support to the existence of not only a random distribution of electroconductive points on the skin, but an organized system of them as well.

Because of a possible relationship of these electroconductive points to acupuncture points, an acupuncture needle was inserted randomly in the forearm while visualizing the index finger. The spark discharges at the index finger were noted to become generally brighter. The same technique was then repeated a second time, only the point of needling was made specifically at the acupuncture point large intestine 11, at the outer edge of the elbow crease in the homolateral side. After 60 seconds the larger bright points of the index finger again became brighter while the smaller and less evident points seemed to become relatively dimmer (Fig. 4). The line of points therefore became selectively brighter. The similarity of results in both cases is most likely a function of cutaneous reflexes.[5] The dissimilarity is not easily explainable but may involve a separate mechanism.

Another interesting thing was noticed. On two different subjects, the brighter points in a linear configuration seem to be in the same loci on the respective fingers. Fig. 5 shows the index finger under similar condition as the one taken in Fig. 4. Note that major bright points appear in the same locations in both photographs even though each represents a different test subject. Compared to direct observation,

Fig. 1.
Index finger in high frequency field revealing linear points when placed against transparent electrode.

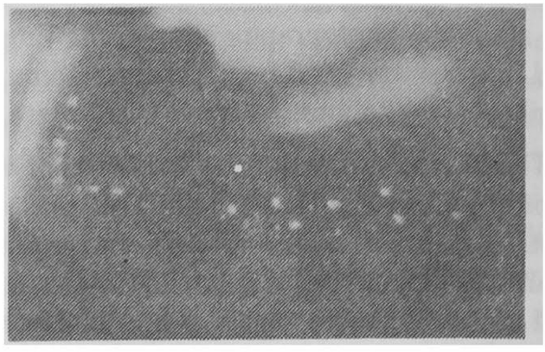

Fig. 2.
5th finger revealing linear configuration of spark discharge points.

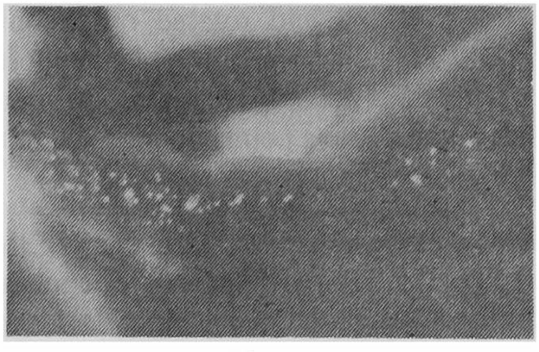

Fig. 3.
5fh finger rotated, noting loss of linear pattern.

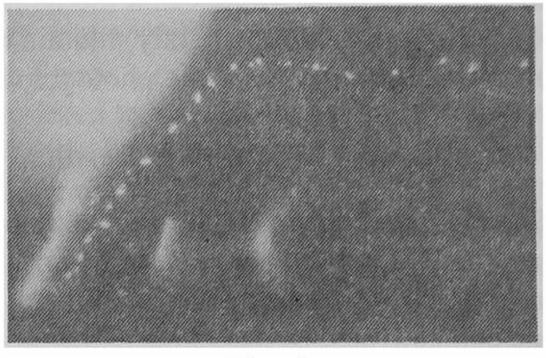

Fig. 4.
Index finger after acupuncture stimulation revealing greater definiton of discharge points.

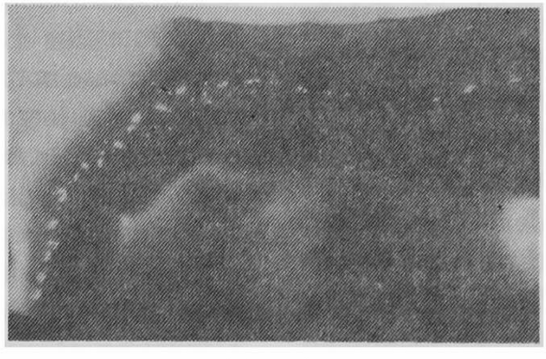

Fig. 5.
Index finger of different test subject than Fig. 4, revealing similar pattern of points.

stop-action photography seems to make this phenomenon clearer since the flame discharges visually undulate in brightness to a degree. This observation again lends support to the existence of a system of organized electroconductive points which may exist in all humans and living things, and which may have a number of implications in the determination and detection of states of health and disease.[4]

Conclusions

The experimental technique described demonstrates visually and photographically the existence of distinct electroconductive points on human skin. These points appear to form distinct organized patterns on the skin, which appear to be systematically consistent on more than one test subject. The brightest observed points of electric discharges on the skin are the same as those detectable galvanically, representing electrically active areas of the skin which are known to be manifestations of an increase in underlying autonomic nerve activity. They also closely correspond to the points noted on oriental acupuncture charts and have been shown here to be affected by acupuncture stimulation.

Since the technique of Nakatani[4] has shown that low voltage detection of these points is indeed related to subclinical as well as clinical disease states, it is likely that a similar relationship exists between the photographic detection of these points and the voltage used in the technique. A follow-up study varying the voltage of the high frequency generator on known healthy and diseased subjects is proposed in order to test the clinical significance of this technique in the early detection of disease. Studies to further elucidate the neurophysiological effects of acupuncture are proposed, using the photographic technique to detect specific changes in point electric discharges during acupuncture therapy.

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